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eye to pick out all land lying at about the same level. This method enables those who are not versed in reading contours and hachures to get some idea of the nature of the ground forms. In the author's opinion:

Contours reasonably close together should form the principal feature of any method of representing ground forms. Contours by themselves give a very fair representation of the ground. Vertical hachures, if printed so as not to obscure the detail and names, or stipple shading, when there is not too much colour on the maps, increase the pictorial effect and are useful additions to contours; ground forms should preferably be in colour, and where hachures or stipple are used, as well as contours, both should be in the same colour.

With regard to the vertical interval of contours, he thinks that if the contours are printed in colour the vertical interval may be such that, on steep ground, the contours will be reasonably close together, but if the contours are in black, they cannot, with advantage be so close. He thinks it preferable for the contour interval to be uniform throughout a country, but this view is not universally held.

Sir Duncan also considers, at some length, the reproduction of maps, and is inclined to think that if considerations of time and cost do not admit of reproduction by engraving on copper, the map should be reproduced by some photographic method and printed in not more than five colours.

THE WINNIPEG MEETING OF THE BRITISH ASSOCIATION.

If there was some early scepticism as to taking the British Association to the remote capital of Manitoba for the meeting of 1909, no trace of hesitation remained when the officers and members began to gather on the prairie in the closing days of August. Several hundred from Great Britain, a number from the Continent, a hundred or more from the United States and the remainder from Canada, made up nearly or quite 1,400 members. With true Western spirit there was satisfaction that the enrollment of Montreal in 1884, and that of Toronto in 1897, were exceeded by the chief city of western Canada.

The very complete arrangements were possible through the interest of citizens of Winnipeg, and by reason of liberal grants from the Dominion and also from the governments of each of the western provinces. The Honorary Local Secretaries were Mr. C. N. Bell, Hon. W. Sanford Evans, Mayor of Winnipeg, Professor M. A. Parker and Professor Swale Vincent. The local appointments left little to be desired, and the secretaries in charge exhibited, in this regard, such efficiency as might well be emulated by other local committees. A large and bare drill hall was made attractive by decorations, and the completeness of its offices, and of its facilities for correspondence and for conferences and social greetings, added much to the satisfaction of every guest. The rooms for sectional meetings were in every case ample in size, light, seating, and in the equipment of lanterns and other conveniences for the presentation of papers. Very full space was

accorded for reports, by the Winnipeg papers, and the London *Times* is said to have had three representatives engaged throughout the meeting.

The seventy-ninth annual meeting was opened at the Walker Theatre on Wednesday evening Aug. 25. The retiring president, Sir Francis Darwin, was unable to be present, but a letter from him was read, preceding the introduction of the president for this meeting, Sir J. J. Thomson of Cambridge. In beginning his address he took up some educational problems, and appeared to touch a note of deep interest when he advocated an interchange of students between the universities of Great Britain and those of the colonies. The greater part of the address was devoted to recent advances in physics.

The period since 1897, when the Association last met in Canada, was characterized as one of unparalleled activity in many branches of physics, a fact which was ascribed to a single discovery: that of the Rontgen rays, to which was attributed new light on electricity and on the structure of matter. An important feature of the opening session was the presence of Lord Strathcona, Lord High Commissioner of Canada at the Court of St. James, who for seventy-one years has been intimately identified with the commercial and political development of the Dominion. He arrived in Winnipeg on the day of the opening session and was received, not only by the men of science but by many civic bodies, with every mark of distinction. To meet him came Mr. James J. Hill from the United States, thus bringing together two men who have had a large part in the geographic unfolding of the Northwest.

Col. Sir Duncan Johnston was president of Section E—Geography. The Secretaries were: Prof. George G. Chisholm of Edinburgh and Prof. J. McFarlane of Manchester. To the sectional committee belonged also Messrs. C. N. Bell, A. P. Brigham, J. Stanley Gardiner and Sir Charles Watson. The President in his address reviewed the geographic progress of the year, referring briefly to the explorations of Dr. Sven Hedin, Dr. Stein and Lieut. Shackleton, and he named, as in progress, the researches of Col. Kozlof in Mongolia, Lieut. Boyd Alexander in West Africa, the Duke of the Abruzzi and Dr. Longstaff on the Indian frontier, Commander Peary and Captain Mikkelsen in the Arctic regions and M. Charcot in the Antarctic. The principal part of the address dealt with maps as suited to various purposes, and afforded a body of useful suggestions based on the author's experience as former head of the Ordnance Survey.*

As was to be expected, Canadian geography was well represented. Mr. A. O. Wheeler, topographer of the Canadian Survey, gave a popular address on "Some Characteristics of the Canadian Rockies," accompanied by an extended series of lantern views. Incidentally, it is evident that Mr. Wheeler, as head of the Canadian Alpine Club has promoted in a large way the general appreciation of the magnificent scenery of western Canada. In the same connection, Professor A. P. Coleman contributed a paper on Yellow Head Pass and Mount Robson, in which the glories and difficulties of the latter mountain were vividly presented. It is interesting to note that within a few days of the presentation of this paper, came the news that the summit had been conquered, by Mr. Kinney, Professor Coleman's companion in previous attacks. Transportation was represented by two papers: Mr. L. J. Burpee read one on Water Routes from Lake Superior to the westward, and Dr. Robert Bell, the veteran geologist and geographer, presented, with keen interest and forceful argument, the need and the advantages of the Hudson Bay

* The paper, so far as it relates to maps, appears in the October number of the *Geographical Journal*.

route to Europe. There is abundant evidence that the growing Canadian West will not wait indefinitely upon the indifference of the older provinces or the hostility of the eastern commercial ports.

Mr. James White, geographer of the Department of the Interior, gave two papers; one a summary of recent economic and industrial development in Canada, and the other on the Nomenclature of the Islands and Lands of Arctic Canada. Professor Mavor of Toronto read on the Economic Geography of Canada, and on Thursday afternoon, Aug. 26, the Sections of Geography, Economics and Agriculture held a joint session, at which two papers were given: by Professor Mavor on the Development of Northwest Canada, and by Professor A. P. Brigham on the Development of Wheat Culture in North America. Mr. J. B. Tyrrell read on "A Great Geographer—David Thompson." Mr. Tyrrell's paper gathered added interest from the report soon following, that in the Parliament Building fire in Ottawa, there was serious loss of Thompson's records and journals. Professor Gregory described the workings of the policy of a "White Australia," showing that the last indentured Kanaka will this season leave Australia, and that, contrary to the predictions of some, the sugar industry had not languished but had prospered, and white labor had proven cheaper than colored, and was leading to the breaking up of large sugar plantations into small farms worked by white settlers. On Monday a joint session was held with the section of Education, at which Professor R. E. Dodge discussed Secondary Geography in the United States, and a paper by Dr. Charles H. Leete was read in his absence by the secretary. Other authors and papers were as follows: J. Stanley Gardiner, The Seychelles; Professor W. H. Hobbs, Cycle of Alpine Glaciations; Miss L. A. Owen, Floods in the Great Interior Valley of America; Geo. D. Hooker, The Influence of Mechanical Transportation upon the Framework of Cities; Professor Dodge, The Formation of Arroyos in Adobe-filled Valleys in the Southwestern United States; Professor D. W. Johnson, The Development of Nantasket Beach; Dr. L. A. Bauer on the work of the Carnegie Institution in the field of Terrestrial Magnetism; Dr. F. P. Gulliver on the "Beaches of Nantasket," and Mr. Allorge of Oxford on the Eastern Atlas mountains.

Section C, that of geology, whose President was Dr. A. Smith Woodward of the British Museum, afforded a number of papers of geographic interest, including an account of the extent of the ice sheets on the Great Plains by Professor Coleman; the Glacial Lake Agassiz, by Warren Upham; the rainfall run-off ratios in the Prairies of central North America by Professor C. F. Chandler; Dr. Tempest Anderson on the Volcano of Metavanu, and Professor S. H. Reynolds on certain aspects of British scenery, illustrating the work of the committee on geological photographs.

As might have been expected, the Sub-Section K, devoted to Agriculture, was well sustained, the chairman being Major P. G. Craigie, and agriculture being the chief interest of the environs of the territory. Wheat came in for a large share of attention and it is understood that the Association will publish a special volume embracing the papers on wheat and allied subjects. Major Craigie's presidential address analyzed the problem of supplying bread to the increasingly dense populations of Europe, America and other lands. He urged emigration, the policy of bringing the men to the food rather than the food to the men. This was quite in accord with public conviction in western Canada, a land whose chief call is now for settlers and workers. He showed that the ten years following Sir Wm. Crooke's famous address had seen a wave of increased wheat production sweeping over the

world. While expecting help from the chemist toward increased future crops, Major Craigie was inclined to look more hopefully to the botanists, particularly in the breeding of new varieties. One important group of papers in this section related to the problems of the Canadian forests.

Under Cosmical physics, Dr. L. A. Bauer read on the results of some recent work in terrestrial magnetism, and Dr. R. F. Stupart discussed the distribution of atmospheric pressure in Canada. Professor A. L. Rotch presented the results of the highest balloon ascent in America. In the Zoological Section, Mr. J. Stanley Gardiner gave an illustrated lecture on coral reefs; and in the Section of Botany, Professor Henry C. Cowles discussed the fundamental causes of succession among plant associations. Under engineering, there were papers on the navigation of the St. Lawrence; on the engineering works of the Panama Canal; on the national transcontinental railway, and on great engineering works of the Canadian Pacific Railway. This section also invaded the agricultural field in the paper of Mr. W. B. Lanigan on grain handling, and in that of Mr. G. Harcourt on the development of the grain industry of Western Canada and its future possibilities. The president of the Engineering Section was Sir William White, who for many years was chief naval designer for the British Government. Sir William, in his presidential address, took up the relations of the work of engineers to the foundation and development of the British Colonies beyond the seas. He dwelt especially upon the maintenance of the imperial navy, and he continued the same line of discussion in later addresses before the Canadian Club of Winnipeg and before a large public audience in Vancouver.

Several representatives from the United States presented papers in other departments. Among these were Dr. Percival Lowell, Professor G. A. Miller, Professor Florian Cajori, Professor E. L. Nichols, Dr. George M. Gould and Professor F. H. King.

The social events were numerous and of such a character as to introduce the members and guests most happily into the life of the growing metropolis and to give them vividly the background of its history. Among these functions may be named the reception given at the Government House by Lieutenant-Governor McMillan and Lady McMillan; by Mr. Chipman, Commissioner of the Hudson Bay Company, and Mrs. Chipman, at Lower Fort Garry; by Lord and Lady Strathcona at Silver Heights, and a Conversazione at the Royal Alexandra Hotel, by the Local Executive Committee.

Saturday, Aug. 28, was given up to excursions. The botanists went to Winnipeg Beach, the geologists to Stoney Mountain, the engineers to the power-house and works at Point du Bois and the agriculturists, to the number of 100, went by special train to Portage La Prairie and were driven to the grain fields to witness the handling of the grain in the various processes of harvesting and threshing.

The closing general session, facetiously known as the "butter meeting," was held on Wednesday afternoon, Sept. 1, in the legislative chamber of the Parliament House. Addresses were made and resolutions moved by President Sir Joseph Thomson, Sir William White, Major Craigie and Sir Charles Watson. Responses were made by the Premier of Manitoba, the Mayor of Winnipeg, Mr. Alex. Haggart, M. P., Principal McDermid and Mr. D. C. Cameron. A lamentable event occurred within a few days of the closing of the meeting, in the sudden death of Principal McDermid, a most eminent citizen of Winnipeg, who had devoted himself without stint to the success of the meeting.

It was the strong desire of the agriculturists that their organization be raised

to the dignity of a full section, and it is understood that this has been recommended by the general committee, in connection with a prospective revision of the entire sectional organization.

The president of the Association for the current year is the Rev. T. G. Bonney of London. Professor Herdman and Major P. A. MacMahon are retained as general secretaries, and the following were elected to the general council: Professor H. E. Armstrong, Dr. J. J. H. Teall, Sir J. Wolfe Barry, The Right Hon. Earl of Berkeley and Professor Jas. L. Myres. The next meeting will be held in Sheffield. The meeting of 1911 will be held in Portsmouth and the council has under consideration an invitation from Australia to meet in that country in 1912.

Unfeigned delight with Winnipeg and with the general success of the meeting was universally expressed, and it is believed, by residents of Winnipeg and others, that important results will be felt in the development of agriculture, in the progress of local education and in cementing the bonds between Canada and the mother land. Frank discussions were held concerning the present status and future development of the University of Manitoba.

On Thursday evening, following the meeting, about 180 officers and invited guests left by special train for the west over the Canadian Pacific Railway. Eleven days were occupied in the excursion, stops being made and local receptions and excursions being had at Regina, Moose Jaw, Calgary, Victoria, Vancouver and Edmonton. The return journey from Edmonton was made over the line of the Canadian Northern Railway. At Medicine Hat a short stop was made, where the visitors from the East and from over the sea witnessed a group of Indians in the full variety of age, sex and aboriginal decorations. Mountain excursions were made at Banff, Laggan and Glacier. At Edmonton the party were taken down the Saskatchewan in a steamboat, and the capital and province of Alberta proved a revelation to many in the variety of its resources, including unlimited coal, grains, and live stock interests to warrant the building of a great packing house, which is now under construction. The reader will be interested in the impression made by the speeches of representative citizens of the western centers, all breathing fervent loyalty to the Empire and pledging every endeavour to maintain and protect its integrity. There is unbounded confidence in the Northwest, and a whole-souled appreciation of that great volume of emigration of strong men now passing the border from the United States. The following guests from the United States accompanied the party:

Professors Henry Crew, C. R. Mann, Hugo Münsterberg, G. A. Miller, D. C. Miller, A. L. Rotch, G. W. Bissell, H. A. Bumstead and A. P. Brigham, Doctors L. A. Bauer and F. P. Gulliver, Professor E. L. Nichols, Mrs. Nichols and Miss Nichols, Professor H. C. Cowles and Mrs. Cowles. An admirable feature was the presence in each car of a Canadian conductor, expert in some field of science, and widely familiar with Canada. Among these were Dr. Robert Bell, Dr. William Saunders, Mr. J. B. Tyrrell and Mr. James White.

The Association made its attendants and visitors feel its unity and sustained vitality. In Great Britain the central body, by reason, perhaps, of its more compact sphere of operations, has been able to retain the interest which in the United States has largely gone forth to the special societies which now stand for progress in the several sciences.

ALBERT PERRY BRIGHAM.